ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

(Formerly Review of Telegraph and Telephone.)

Vol. 6, No. 4. WEEKLY. | NEW YORK, SATURDAY, MARCH 28, 1885. | $3 per annum. Single Copies, 10 Cents.

Copyright, 1885, by ELECTRICAL REVIEW PUBLISHING COMPANY, 23 Park Row, New York.

Entered at Post Office, New York, as Mail Matter of the Second Class.

The Schuyler Electric Light System.

RE-ORGANIZATION AND PROGRESS OF THE COMPANY.

In view of the fact that the Schuyler Company is stepping to the front rank of the electric lighting fraternity, and rapidly introducing a system, the many excellent points of which deserve special commendation, its description will doubtless be of interest to the readers of the REVIEW, both for the novelty of its features, and as an exhibition of the recent advances made in applied electricity.

The past two years have brought forth much golden grain in the field of practical discovery much of which, however, for commercial reasons, still remains unchronicled, and we must turn to the central lighting stations, examine into the construction of apparatus, the methods of operation and regulation etc., before we can fully realize the great progress that has been made.

It is one thing to *devise* a system of electric lighting, but quite another to conceive and put into *practical* operation one that will realize the proper claims to satisfactory results as regards economy and reliability. Fully alive to the enormous strides being made in the applied sciences, and to the necessity of keeping equal pace, no expense has been spared, either for experiment or the application of its results. It has been the good fortune of this company early in its history to engage the services of Mr. Gustav Pfannkuche, formerly of the Pilsen-Joel Electric Light Company, of London, England, an electrician of the most modern school, who had thorough practical training in the work of designing and conducting electrical plants as well as a very high theoretical knowledge. His inventions were already important and very successful, strikingly marked by a practical character, and utilizing effectively principles that were only half understood, if understood at all, up to that time. He became the chief electrician of the company and with able assistants added immensely in a short time to the value of the company's machines and lamps.

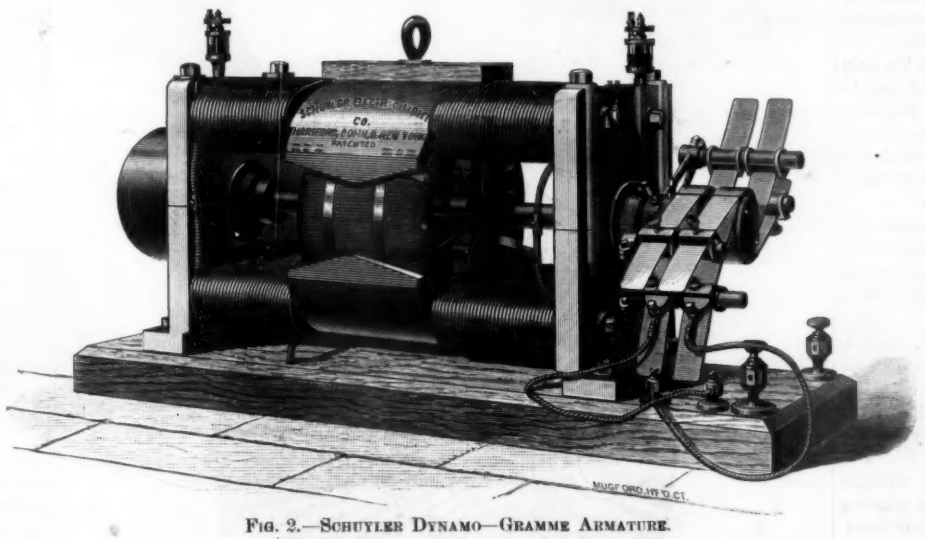

FIG. 2.—SCHUYLER DYNAMO—GRAMME ARMATURE.

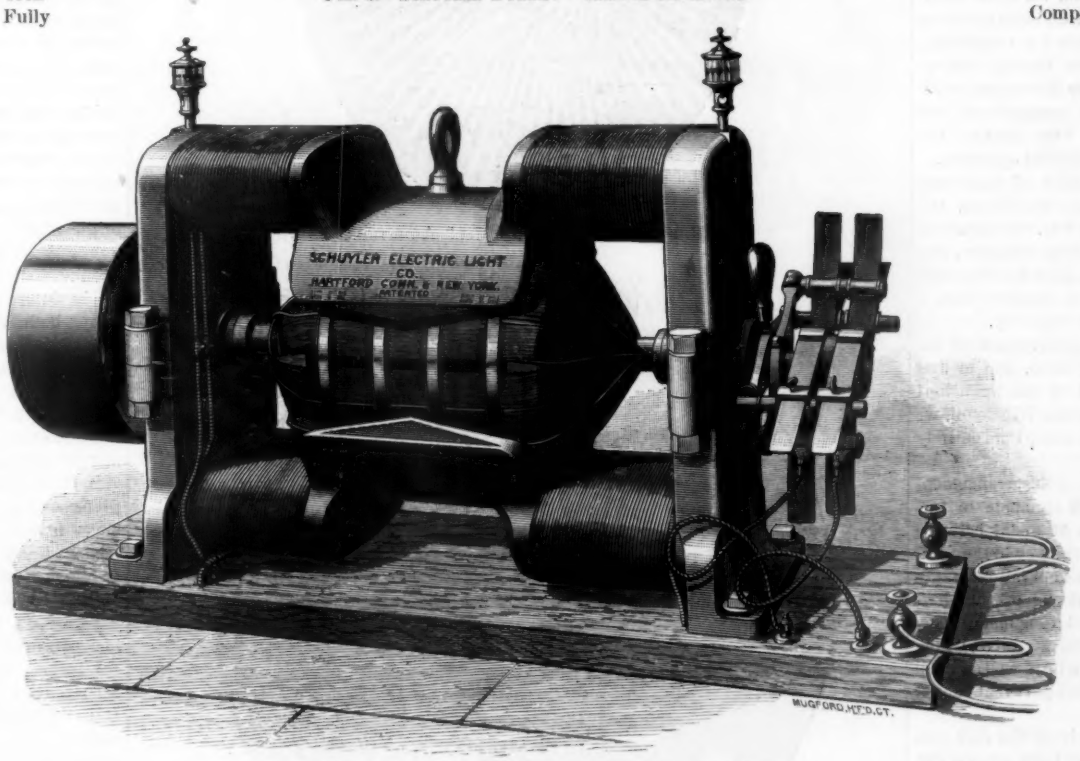

FIG. 1.—DYNAMO MACHINE FOR TWENTY-FIVE ARC LIGHTS.

RE-ORGANIZATION OF THE COMPANY.

At a meeting of the trustees of the Schuyler Electric Light Company, held in New York last week, the Hon. Henry M. Cleveland was chosen its president. This action was deemed necessary owing to the rapid increase of business, which demanded not only increased facilities for manufacturing, but additional help in the executive department. The company is to be congratulated upon having secured Mr. Cleveland's services as president. He has spent about a month investigating the system of the Schuyler Company in comparison with that of other companies, and has become satisfied that the Schuyler Company produces one of the best lights in use, and that the financial prospects of the company are very flattering.

In the reorganization, Mr. Chas. E. Dustin becomes vice-president and treasurer, and will also continue as general manager. Mr. Dustin is known as an honorable, intelligent business man of long experience in Hartford, and deserves the cordial thanks of the stockholders in the company for his success in reconstructing and developing its interests.

The Schuyler Company was organized in 1882 on a capital of $1,000,000. In 1883, inducements were offered for removing the works to Hartford, and a small space was engaged at the works of the Hartford Engineering Company. In the fall of 1883 Mr. Charles E. Dustin took hold of it with other influential gentlemen. After examining the matter very carefully, they became satisfied that there was a nucleus for an enormous business in the manufacture and sale of all kinds of electrical apparatus. The field was very large; not only was the arc lighting rapidly gaining popularity, but the incandescent system was acknowledged to be the coming light.

Mr. Dustin went to work to perfect a reorganization, and during the year confined the sales of the company to isolated plants alone, making no efforts for lighting from central stations until such times as he could get the company on a fair and square business basis. To this end, he had the capital stock reduced from $1,000,000 to $250,000. Of this sum a large portion was paid in cash and a small portion for the patents of the company, in order that as progress was made and new patents issued and new inventions produced they would enhance the value of the company's stock, and not be represented by a large amount of "water." Before accomplishing the reduction of stock, however, Mr. Dustin fully reorganized the electrical staff of the company, bringing from England a competent electrical engineer as chief, with four assistants thoroughly versed in their several departments in the manufacture of arc and incandescent lights.

In the matter of patents to be taken out in this country, and to guard against any possible infringement of their rights, an arrangement was made with Mr. C. L. Buckingham, the electrical lawyer of the Western Union Telegraph Company, of New York, who for ten years was examiner in the electrical department at Washington. All inventions were passed by him before the goods were manufactured and put upon the market. Mr. Buckingham has also invented many appliances of great value, all of which were assigned to the Schuyler Company. As an evidence of the care with which this portion of the business has been attended to, it may be stated that but one suit has ever been brought against the Schuyler Company and that was on a minor feature of a dynamo machine, which was not all-essential for the complete system owned and manufactured by the company.

So rapidly has the business grown that the company have extended their works from a small space of about fifty square feet to a large portion of the Woodruff & Beach Works, and to-day they are so cramped for room that they are seriously considering moving to another city. The Schuyler Company now feels that it has succeeded in perfecting a system which is at once reliable, economical, and efficient and for which they make the following claims:

Economy of first cost; durability; the highest degree of efficiency from a machine of given size; the greatest quantity of light from a horse-power of energy; a great

diffusive power and steadiness of light; great safety and convenience in handling.

In the following descriptions of the dynamos, lamps, and other appliances, there is no attempt to go over again the general features common to all such devices, but special features of value will be indicated.

THE DYNAMOS.

All dynamos are constructed on the same general principles, but there is almost as much difference between the Schuyler machines and those used by the earlier inventors as between the best modern steam engines and those first built and operated. They are built on an intelligent comprehension of the chief elements in the problem to be solved, and with the best modern knowledge as to proportion and form of parts, prevention of wasteful and damaging induced currents, practical convenience and durability. The first dynamo of this company, known as the Schuyler dynamo is of the drum armature pattern. This was first developed by the company and has been proved a machine of high efficiency. Recent improvements have been made in this machine which have greatly increased this efficiency. The other is that known as the Pfannkuche machine, as it contains many valuable improvements, the inventions of Mr. Pfannkuche. Its prominent advantages are found in the gain of power and prevention of heating due to intelligent comprehension of the magnetic lines of force, ease of construction, accessibility of every part, ease of adjustment and handling, compactness as a result of these, very high efficiency and durability.

Another important point is the slow rate of speed at which these dynamos require to be run, for it gives a consequent freedom from strain and rack, and a longer life to the machine.

The accompanying cuts, Figs. 1, 2 and 3, show the Schuyler & Pfannkuche dynamos for arc lighting.

Fig. 1 shows the Schuyler machine of the drum armature pattern for twenty-five arc lights, the most striking feature of which is the appearance of lightness and strength combined which it presents. The winding is after the general method for drum armatures, with the exception that there are none of the usual provisions made for ventilation, the inventor's experience having demonstrated to him that these are unnecessary where there is a proper arrangement and proportioning of parts. This machine has proved very efficient in practical operation.

Where but a small number of lamps are required and under certain conditions, the type of machine shown in Fig. 2 is installed, which is built with a Gramme armature, and it is unnecessary to state to those familiar with the working of this form of armature that it attains a high standard of efficiency.

In Fig. 3 we have a representation of the four-pole Pfannkuche dynamo, and at first glance we are reminded of the Schuckert machine, but, upon examining it in detail, we find many features which stamp it an entirely distinct machine.

Attention may be called to the arrangement by which the field magnets are made to furnish a long, solid mass of metal between their poles, thus giving constancy to the field, while, at the same time, its curvature leaves an open space for the passage of the shaft carrying the armature, and thus makes a design singularly compact and attractive, while, at the same time, it gives a form well adapted for efficiency, and leaves no part that cannot be easily reached.

The armature, Fig. 4, is of the disk pattern, and consists of a core built up of a ribbon of soft iron, wound spirally upon itself to the proper diameter, leaving space at the center for the shaft to pass through, and insulated at each turn by a strip of linen of considerable thickness, which is wound with the ribbon. This core is then wound from center to periphery with a parcelling of linen strips, each turn lapping the previous one until the surface is covered; a coat of shellac is then applied. A band of metal is placed, like the tire on a wheel, upon the circumference of the disk; this band carries metal lugs of dovetail shape, about two inches centers, to which fasten horseshoe-shaped saddle pieces of soft iron about three-eighth inch thick and five-eighth inch wide, tapering slightly toward the ends; the legs, which are about five inches long, fit over the periphery of the core disk, and pass radially toward the center. Between these saddle pieces is wound the wire, the ends of which are carried to the shaft and along it to the commutator, being carefully insulated at every point. It will be seen that the method of winding is very simple, and that all parts of the machine are easily accessible and the ventilation perfect.

The results of these improvements on the common flat ring dynamos are an increased efficiency of about 30 per cent., it is claimed, absence of sparking at commutators, low internal resistance, effective self-regulation and high electrical efficiency. The dynamos driving 100 lights and upwards, it is claimed, show an efficiency of about 95 per cent.

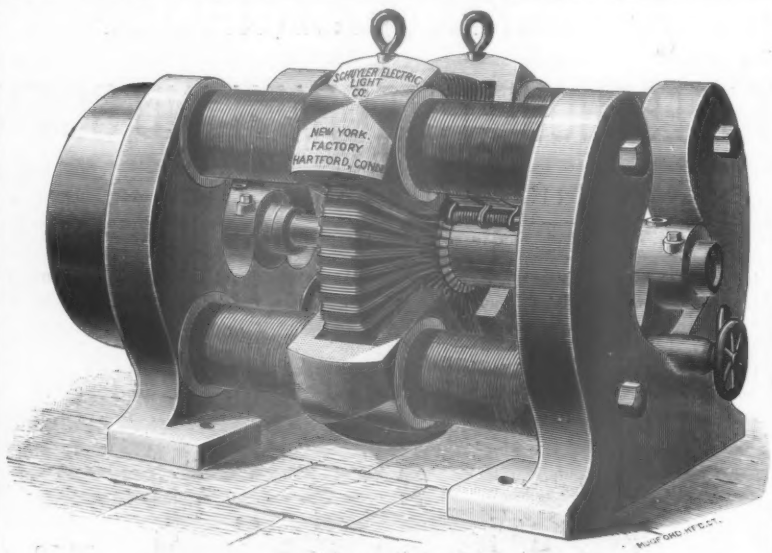

FIG. 3.—THE "PFANNKUCHE" DYNAMO.

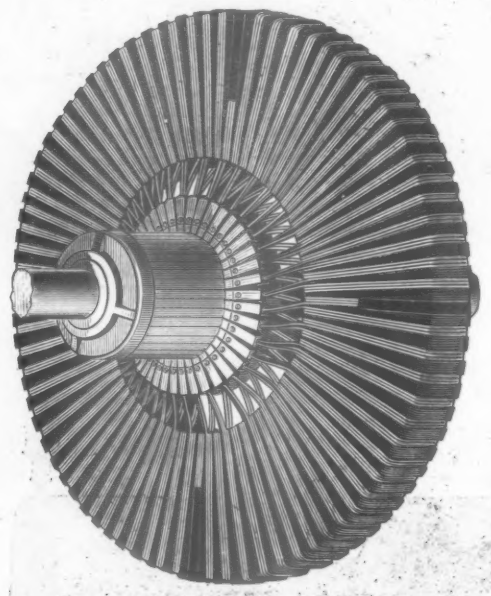

FIG. 4.—THE "PFANNKUCHE" ARMATURE.

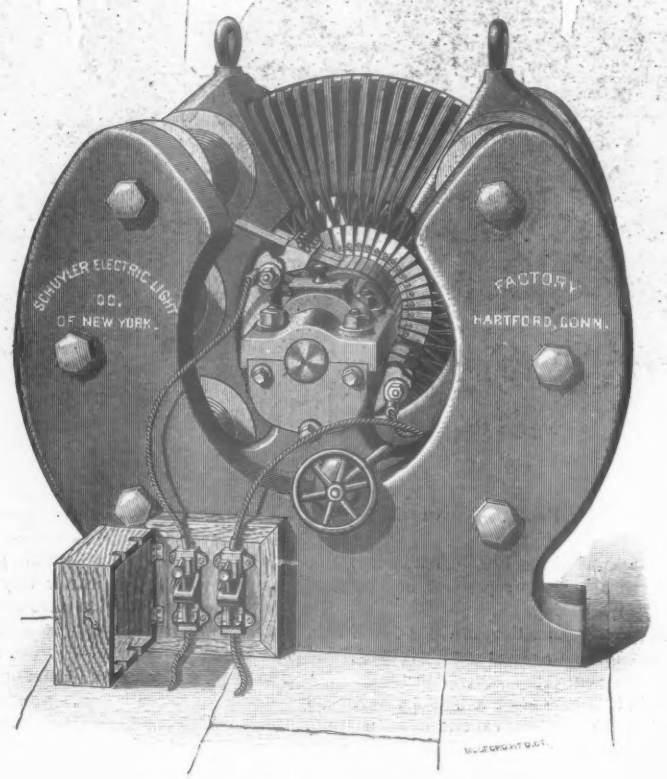

FIG. 5.—END VIEW, PFANNKUCHE DYNAMO.

The dynamos for incandescent lighting are built on the same general plan as the others, but the winding and size of wire is, of course, different.

Fig. 5 gives end view of one of these machines. The current furnished by them is perfectly steady and absolutely harmless. The incandescent dynamos are made to produce any number of lights from fifteen to five hundred. They are perfectly self-regulating, and any number of lights on the circuit can be turned on or out without affecting the rest, a corresponding change taking place in the power consumed by the machine.

AUTOMATIC REGULATION.

The Schuyler system of electric lighting possesses an automatic method of regulation of the dynamos that renders the current perfectly steady, and the regulation of the lamp such that an imperfect carbon of the poorest quality rarely produces the faintest hissing, and the only effect noticed is a slight flame, while the imperfection is being consumed. The regulator used with the arc light dynamo is based on the principle of generating only so much electromotive force as is needed to supply the number of lamps in use at any given time.

This is a very different thing from generating it and only using part of it. The device as shown in Fig. 6 consists of a relay of extreme sensitiveness, and a motor which acts on an arrangement of resistances for preventing the generation of more current than is called for by the lamps actually burning.

The other attachments shown in the figure consist of a device for breaking the whole circuit without danger or sparking, Figs 7 and 8; another for giving a signal if an accident occurs to any part of the circuit, and an automatic cut-out, which acts only in case the alarm signal remains unnoticed for a length of time.

The construction of the dynamo for incandescent lighting is such that no external regulator is needed. This is accomplished by the use of an extremely powerful magnetic field, and a very low resistance in the armature coils thus causing the inductive influence of the field magnets to so far preponderate over that of the currents traversing the coils of the armature as to practically neutralize the effect of the latter. The machine adapts itself to the requirements whether one lamp or the whole number are in circuit.

ELECTRIC LAMPS.

The lamps made by the Schuyler Company, both arc and incandescent, are from new designs and have very decided advantages, it is claimed, in the quality of the light furnished, the ease and safety in handling the arc lights, and the long life of the incandescent lamps, 1,000 hours being given as their average capacity.

In the arc lamp several forms are used, but preference is given to Mr. Pfannkuche's latest invention. It gives a pure, soft and mellow light, without the hard ultra-violet or bluish rays—in appearance it is attractive both in design and workmanship.

Figs. 9, 10, 11, 12, 13 and 14 give a general idea of the appearance of some of the different forms. Substantially the lamp is characterized by its peculiar feeding apparatus. It has a positive motion, and the carbon is never left to the influence of gravity, but is pulled up or down from any position in which it can be placed to that needed for burning to the best advantage.

A detailed description of this form of feed will be given in another issue of the REVIEW. The lamp contains also an ingenious automatic cut-off, by which, in case of accident to any single lamp, it is at once thrown out of circuit, and all the rest on the line burn on unaffected.

In the street light the hood is large and is constructed to reflect in the proper direction, that light which would otherwise be wasted. That for indoor purposes is tasteful in de-

sign, and is provided with an opal globe of peculiar form, which prevents any unpleasant effects from too strong light. The power required for these lamps usually falls far within a horse-power for each lamp.

The double lamp is of the Pfannkuche pattern, provided with two sets of carbons, which last from fifteen to eighteen hours without any attention. These are designed for installation for street lighting, and where lights are needed to be kept burning all night.

The company manufactures focusing lamps and reflectors, for use on steamers, in which the difficult problem of keeping the unequally wasting points of the carbons in the same position, relative to the center of the reflector, is satisfactorily solved.

The incandescent lamps are made under a new process, and are remarkably satisfactory in the light produced, and the average life of the lamps.

These are in the form of pear-shape glass globes, and the carbon is formed from fiber under a peculiar treatment which leaves them with the appearance of a filament of steel, and with something of its elasticity.

They may be pulled or twisted to a considerable extent, and immediately resume the form given them during treatment. When prepared they are mounted on platinum

FIG. 7.

wires, and sealed into the globe. The globe is then exhausted and mounted, and is ready for use. They are tested to burn 1,000 hours or more. Each lamp is of 50 ohms resistance hot, and 117 to 120 ohms cold, and requires a current of one ampere. The company guarantee 10 standard lights to the horse-power of energy. Each lamp is provided with a socket, and can be so arranged as to be turned on or off at will by a switch similar to that used on a gas burner, is indicated in Figs. 15 and 16.

In lines for incandescent lights a safety device is placed in all branches, in fixtures and chandeliers, and in other convenient places, to provide for any possible overloading by the current. This device consists of a small strip of metal, which will fuse at a temperature slightly above that usually carried on the wires, and thereby cut out the entire line and avoid all possibility of danger. These safety fuzes are shown in Figs. 17, 18 and 19.

A simple and effective cut-out of new design is used wherever wires run into buildings, so that lamps may be cut out or turned on from the outside. An indicator shows the amount of current constantly going over the wire, and rings an alarm, should any unusual flow of current go over the line, or should the automatic regulator fail to do its work. The indicator is usually combined with the regulator, and both so arranged as to work alone or together.

Figs. 20 and 21 show the section and perspective of the double switch for throwing one dynamo in and another out of circuit where a group is connected in a series or parallel arc.

In addition to their electric lighting business the Schuyler Company manufacture and supply electric motors and storage batteries.

This company has shown a spirit of enterprise which not only favors its own progress, but that of the electric lighting interests in general. They are fully prepared to demonstrate that lighting from a central station is not necessarily confined to a large city, but that a city of, say, 5,000 inhabitants can likewise have the advantages of arc and incandescent lighting, and at a low cost.

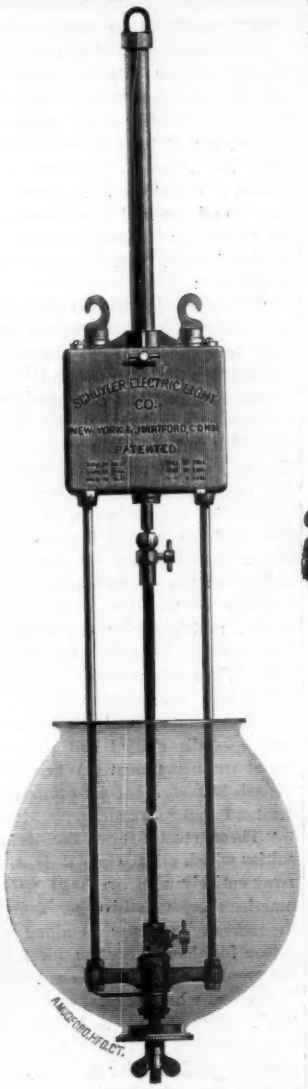

FIG. 9. OUTSIDE LAMPS.

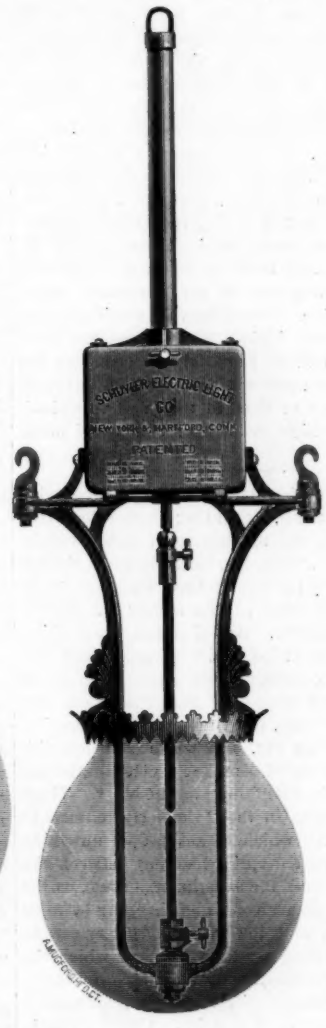

FIG. 10.

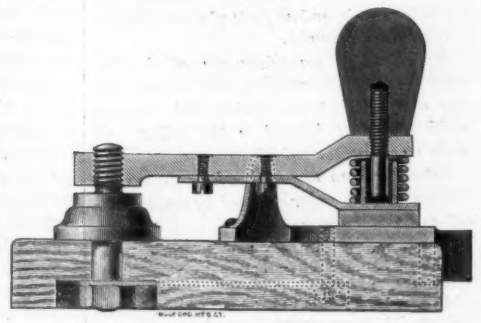

FIG. 8.—SINGLE SWITCH.

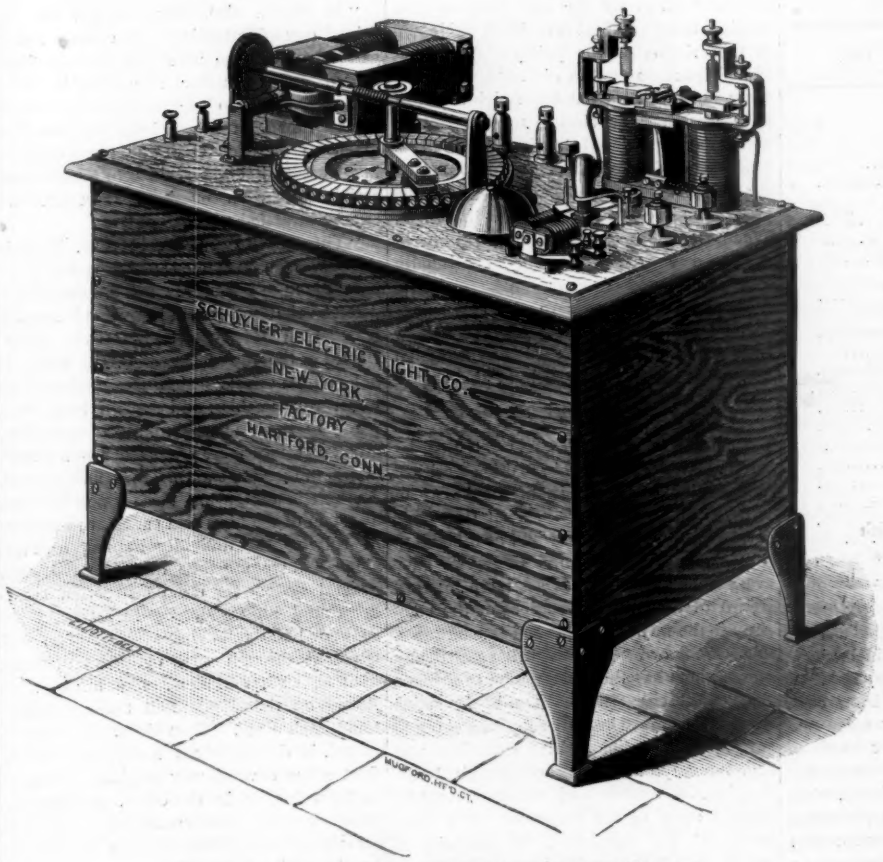

FIG. 6.—AUTOMATIC REGULATOR FOR ARC DYNAMO MACHINE.

Gas vs. Electric Lights.

Prof. Woodward has been delivering, in St. Louis, an important course of popular lectures no "Sanitation." Concerning ventilation he stated some things which are of general interest. For example, the distinguished lecturer declared that every man vitiated sixty times more air than he breathed. In one minute a gas jet would vitiate thirty three feet of air, and a person ten feet. Gas jets and lamps produced carbonic acid, a steam. London gas gave out sixty-feet of carbonic acid to the hundred; Manchester gas, sixty-three feet to the hundred, and St. Louis gas some sixty feet to the hundred. Electric lights did not vitiate the air. A person who had breathed foul air long would first be affected with drowsiness, then with a partial coma of the will power, and finally with a torpor creeping along the limbs. These symptoms were premonitory of approaching dissolution, and were always experienced in the first stages of death by suffocation.

A man would sit in a foul atmosphere for hours till his energies and will-power were partially paralyzed, and then go out into the keen night air. If he caught cold, as ten chances to one he would, he laid it to the cold horse-cars. Low ceilings were no better nor worse for securing good ventilation in a house than were high ceilings. The air in a flue could be said to draw only by a violent misuse of language, since, in fact, it pushed itself up the chimney.

Slowly perhaps, some think, but *surely* at last all admit the electric light will win as an illuminant.

* * Dr. Wahl, in his usual report to the Franklin Institute, says of the progress of science and the arts, that the Signal Service of the Government is employing the balloon for the purpose of studying the physics of the higher atmosphere. A United States signal officer made an ascension on January 19th, in this city, with Professor King, and another was made last Monday. Dr. Wahl also spoke encouragingly upon the prospect of having cheap gas in the near future, mainly by utilizing the natural gas in the western part of Pennsylvania, and the discovery in New York of a new process for making soda ash as cheaply as the foreign article. A number of samples of lincrusta material for the interior decoration of houses, a new underground conduit, and several instruments used by surgeons for illuminating the throat when operations are necessary, were shown. In the latter the illumination is effected by means of a little Edison incandescent lamp and a mirror, by means of which the surgeon can work with much certainty and dispatch.

.... On Friday last, Receiver Butler, of the Bankers and Merchants' Telegraph Company, issued a circular to the employes of the company, stating that parties stood willing to advance him money sufficient to pay seventy per cent. of all labor debts up to March 1, provided that sum would be accepted as a full settlement of all claims. The night force of the New York office received this circular when the operators reported for duty at half-past five o'clock this afternoon, and immediately notified Mr. Butler that unless satisfactory assurance were given by nine o'clock that the full amount due for February would be paid at once and an early day appointed for the payment of the salaries due for the first half of March they would cease work at that hour. Mr. Butler arrived at the office at about eight o'clock, and endeavored to induce the men to reconsider their ultimatum, but would give no assurance that the full amount due for February would be paid, nor would he say on what day payments on account of March might be expected. The entire force, with the exception of the night manager, chief operator and one operator, thereupon left the office in a body. It is understood that the operators comprising the day force will follow suit.

ELECTRICAL REVIEW
A WEEKLY JOURNAL OF ELECTRIC LIGHT TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

Published at 23 Park Row.
P. O. BOX 3329.

GEO. WORTHINGTON, WM. A. HOVEY, - - - Editors.
CHARLES W. PRICE, - Associate Editor.

SUBSCRIPTION.

United States and Canada, $3.00 per annum, in advance.

Great Britain and other foreign countries, $4.00, in advance. Postage free.

ADVERTISING.

Transient, 25 cents per line, nonpareil.

EDITORIAL ANNOUNCEMENT.

Address all communications and make all checks and P. O. orders payable to order of ELECTRICAL REVIEW P. O. Box 3329, New York.

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Mr. J. Viennot, 150 South Fourth Street, Philadelphia, is our accredited representative for Pennsylvania

Mr. Charles W. Price, 103 Adams Street, Room 9, Chicago, Ill., is our representative for the West.

Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, MARCH 28, 1885.

CONTENTS.

	PAGE
The Schuyler Electric Light System	1,2,3
Gas vs. Electric Light	3
Balloons for Studying the Higher Atmosphere.	3
Editorial Notes	4
Underground Wires Abroad	4
Some Practical Suggestions	4
Notes from Chicago and the Northwest	5
New Orleans Electric Light News	5
Telephonic News	6
The Telephone Contest	6
Meeting of the Mexican Telephone Company	6
Wilson Lightning Arrester	6
Western Union Telegraph Company Statement.	6
The New Postal Law	7
Telegraphic News	7
Overhead Telegraph Lines in China	7
Electrical and Scientific	8
Economy of Fuel	8
New Electric Railway in Kansas City	8
Franklin Institute Report	8
An Electric Railway	9
Electric Light News	9
Electrical Patents	10

Our contemporary, the *Manufacturers' Gazette*, says that "the tacit belief that a better feeling is beginning to prevail in business circles seems to gain ground every day." A better demand is reported for iron, coal, hides, and the lower grades of woolen and cotton goods. The stocks in the hands of the retail dealers have of late been so low that they had to make some purchases, while the surplus of idle money in the possession of large merchants and manufacturers prompted them to come to the market as a matter of speculation.

The multiplication of lines and the decrease in rates for telegraphic messages has resulted, as was to be expected, in a large increase in the volume of business. Nowhere is this more apparent than in the press. Liberal in the use of the wires as it was two years ago, it is far more so now, and whole columns of matter which, five years ago, would not have been thought of sufficient value or importance to warrant the expense of telegraphing it, are now sent through with a lavishness that smacks of extravagance. In fact the increase in the size of the leading papers of the country, very marked within the past five or six years, is in great measure due to the very liberal way in which the telegraph is now used. Competition has brought prices down, it is true, in some cases to a point so low that it is doubtful whether, considering the expense of delivery, the rate repays cost, but as a matter of fact the volume of business as a whole has been enormously increased, and there is no large business of which some part is not necessarily unremunerative. The Western Union's *alter ego*, the Mutual Union, takes messsages from Boston to New York for ten cents for ten words, as a matter of competition, but there are plenty of lines in the Western Union's system which make up for this and much more.

San Francisco taught us the practical value of cable roads, by putting them into actual operation and making them a commercial success. It begins to look a little as though the city by the Golden Gate was about to do the same thing in the matter of electric street railways. Not that the same thing has not been tried, and with measurable success, in Cleveland, but has it been much more than tried? If San Francisco goes into the thing, it will go in "for keeps," as the children say, and will be satisfied with nothing short of complete success on the one side or absolute failure on the other. There is something in the "wonderful climate of California" which makes people unwilling to leave an enterprise hanging between the practical and the experimental stage, as the coffin of Mahomet was left hanging between the earth and the sky. It is very certain that the iron conduits through which the cables are carried are the ideal things for carrying the necessary electric current conductors, and it is not at all certain that the inevitable loss of current and consequently of power is not fully offset by the loss occasioned by hauling miles of dead weight of cable and in the friction of the pulleys. Now that Philadelphia has got to dig her conduits up again and repair the damage which the frost has occasioned by closing up the slot in which the "grip" rod travels, she will have time to consider whether it would not on the whole be better to use her power for the production of electricity, and to invest in dynamos and motors rather than in untold miles of steel cable which will be continually wearing out and requiring renewal. Philadelphia has a chance to distinguish herself by substituting electricity for cables, without ever having put the latter into actual use. Will she avail herself of the opportunity?

A committee of the Massachusetts Legislature is just now engaged in making a critical examination of the books of the American Bell Telephone Company. What they hope or expect to find there it would be difficult to say. What they *will* find there, we have every reason to believe, is a straightforward record of the daily transactions of the company in the way of receipts and expenditures, *and nothing else*, nor do we believe that any one of them has the least reason to suppose that aught else will be found. It seems absurd that, just because some one chose to throw out a malicious hint that there was something queer in the company's bookkeeping, its records and accounts must be thrown open to the inspection of a committee of the legislature, the majority of whom, in all reasonable probability, have but an elementary knowledge of the art of bookeeping, if any. Had there been any real seriousness in the charge, in fact, had there been any charge at all, with anything more than a mere assertion to found it upon, experts would have been employed, but as it was a mere suggestion the committee contented itself with its own investigations. It will doubtless know more about bookkeeping when it gets through than ever before, and that is about all the examination will result in.

UNDERGROUND WIRES ABROAD.

As the daily press of this country is continually pointing with scorn at the overhead wires in our cities, and is constantly telling how much better these things are done abroad, it may be well to quote an article from the *Journal International del Telephones*, of recent date. It shows the condition of underground work on the other side, not materially different, save in special exceptional cases, from its condition here. The writer says:

"Every one knows the difficulties which are presented by subterranean lines, considered from the electrical standpoint Their construction interferes with the clearness of communication, and our engineers have not yet been able to do away with the effects of induction and of static electricity. Doctor Jacques, electrician of the Bell Company, has recently studied the operation of telephones in connection with underground lines, and has reached the following conclusions: The telephone operates satisfactorily so long as the product of the electro-static capacity of the line, expressed in microfarads, multiplied by the resistance of the line expressed in ohms, does not exceed 18,000. When this product is between 18,000 and 30,000, transmission becomes less and less clear, and can only be followed by persons specially skilled and practiced in the use of the instrument. When this product exceeds 30,000, it becomes impossible to understand spoken words.

"These results show the technical difficulties which arise when it is sought to do away entirely with overhead wires. But in practice there are still other difficulties, and the increased expense is alone a sufficient reason for abandoning the idea, at least for the present. This is the case, for instance, in Boston, where several systems have been tried. Experiment and calculation show that the cost of putting all conductors under ground, would render necessary an increase in rates charged subscribers, which would be out of all reason.

"In Berlin, also, this question has received careful attention. The poles which carry the telephone wires are already fully loaded, and no more can be added to them. It was proposed to use underground cables enclosed in iron tubes, but this idea was given up on account of the great expense involved, and it was decided to make use of aerial cables, each containing from fifteen to twenty insulated conductors.

"Thus, up to the present time, Paris is the only city, in which underground wires have given satisfaction. But it must be understood that our system of sewers is specially adapted for receiving electric wires. Placed at the top of the arch, the lines do not feel the effects which are produced on underground cables, and they are to be compared to overhead wires, built in exceptionally good locations, protected from atmospheric influences, such as rain and storms. As there is no city but Paris which has such a system of underground canals, this method of solving the difficulty applies to Paris alone, and we are thus driven to risk some general system for the construction of underground lines. M. Fortin Herrman has suggested the following system: The wire is passed through small cylinders of wood (that is, such cylinders, like buttons, are strung on the wire), and these cylinders touch each other. Then the wire, thus protected, is drawn into a lead pipe. A conductor thus covered may be placed in the air, in the water, or in the earth, indifferently, preserving in each case around the wire an air space which forms the best known dialectric, and preserves the wire in all cases in the same conditions as though it were suspended in the air. Mr. Hermann thinks that he has thus solved the problem of having a cable at once in the air and at the same time protected from atmospheric influences and disturbances. It is nevertheless to be feared that this ample arrangement does not annul the effect of static induction. Further experiments, which are to be made forthwith, may give no further light on this point."

It will be seen from this somewhat lengthy but interesting extract, translated from the columns of the journal in question, that in the matter of underground wires, our friends abroad are quite as much in the dark, and, generally speaking, quite as backward as we are in America, despite the repeated assertions of our daily press to the contrary. Of course, in all such statements, the city of Paris is omitted, because its magnificent sewers, which are in reality magnificent subways, which could, on occasions, be used for the transmission of troops and war material from one part of the city to another, offer an opportunity for hanging wires which no other city in the world can or is ever likely to show.

SOME PRACTICAL SUGGESTIONS.

One of the topics proposed for discussion at the recent electric light convention in Chicago was put in the form of a resolution to the effect that the fireman should receive higher pay than the engineer. It was thrown out by the Committee on Topics; and therefore did not come before the convention for discussion; but, while it was an extreme way of stating the case, and therefore gave rise to mirth rather than to serious consideration, the basic fact remains that far too little attention is given to the capabilities of the men who feed the fires under boilers, and to the principles which should govern their work. Firemen are usually "cheap hands"—men who, by a short apprenticeship, have been transformed from common laborers into firemen, and, in a majority of cases, they have never had instruction from any person really competent as to the methods of their work, in order to attain the best results with the least fuel. An electric light plant may be all that fancy ever painted it; the system may be the very best; the engines the most regular in their action and in the use of steam, and the boilers of the very best construction; but, if the fireman does not understand or neglects his work—if he fail to exercise a constant vigilance—the coal bill will surely get the upper hand of the accounts, and show a loss at the season's end.

Considering these facts, which all practical men know from experience, it is a question whether it would not be well for superintendents and others connected with the management of electric lighting companies to make themselves familiar with the principles which govern correct firing, to communicate them to their firemen in such a way as will insure the latter's entire comprehension, and then to hold them responsible for results as indicated by the daily tally of coal consumed. In the case of almost every company it ought to be possible to determine how much coal ought to carry the work through each twenty-four hours with the best attainable firing. This being determined by experiment, any consumption in excess of this ought to demand an explanation, and any continued excess ought to result in a change of firemen. An electric lighting company has got to do its business on a business basis; it cannot afford to be sentimental; it must, if it would succeed, hold every individual to a rigid accountability for his work and its results, and amid them all there is not one who by careless work can do more to invite financial disaster, or by good work can do more towards insuring profits, than the fireman who, shovel in hand, stands all day at the fire-door and pours in coal, which represents a constant output of money. He should be instructed, he should be watched, he should be held accountable, and, like all other employes upon whom responsibility devolves, he should be adequately paid. A cheap fireman is the most costly luxury an electric light company can indulge in. A really good one, who understands his business, and attends to it, is a treasure, and really worth more to the company, service for service, than the man who runs the engines, however efficient he may be. Of course, we would not belittle the importance of the engineer. Properly, he should have the selection and control of the fireman, and *he* should be held accountable for the coal consumption. Theoretically this is often the case, but there are not many instances in which it is actually true that his tenure of position rests solely on results obtained.

Next to the outgo for coal, the most important item of supply expense is carbons. Not long ago the charge for these was so high that it constituted the chief item of expense, but, now that they are down to 2½ cents each, and even lower in some cases, they rank second, except in specific cases where some specially fortunate company, like that in Minneapolis, gets its fuel for nothing, and brings it into the the fire-room by an endless belt. The carbons come carefully packed to prevent breakage, and ought to be served out to the trimmers by exact count. In too many cases this is not done, and the result is that trimmers become careless and wasteful. Such waste is always accounted for on the basis of "crooked carbons," and a little watching will establish the phenomenal fact that some trimmers find, on the average, twice as many imperfect carbons as others. There is a sure and simple remedy for this difficulty. It is to insist that every carbon so defective that it cannot be used in the lamps shall be *brought back*. The decrease in the proportion of crooked carbons that this requirement will occasion is simply startling. We have seen the experiment tried, and have been astounded at its success. We do not hesitate to recommend it to every electric light superintendent in the country.

It is in little economies and guards against waste that savings are made. A proper arrangement of tin pans and screens around a high-speed engine will not only save an immense amount of oil, but prevent the floor from being saturated with it, and thus becoming an element of danger in case of accidental fire. Having a bale of waste where everybody about the premises can help himself at will is not conducive to economy. Allowing the trimmers to help themselves to carbons, without accountability to anybody, will make the supply run out much faster than the most liberal computation would estimate; and, in the matter of fuel, unless it be watched from day to day and from week to week, the coal bill will in time sap the life out of the best lighting company that ever existed.

NOTES FROM CHICAGO AND THE NORTHWEST.

The doings of the late electric light convention are bearing fruit. While the various companies have heretofore felt that to an extent they were compelled by law to take proper precautions in establishing plants—and to do what we are compelled to do is not always consonant with the independence of the typical Yankee—the discussions during the convention so thoroughly sifted out cause and effect in many important particulars, that the majority seemed convinced of the need of proper supervision by some disinterested expert, not only for the general safety of the installations as regards persons and property but the reputation of the company and system itself. A poor piece of work is no recommendation to the electrical engineer, any more than a like quality of manufactured article is creditable to any other designer or maker. A certain amount of hurry-scurry work is always foisted upon the public in the infancy of any enterprise; and the grander the proportions of this, the more likelihood of careless and inefficient work at the outset. But with experience and education the standard of excellence is raised, and in the long run the manufacturer and artisan are benefited.

Close competition has had much to do with a state of affairs which was not at all creditable to very many of the earlier installations in Chicago, and probably other cities have had much the same sort of experience. The controlling supervision of some capable person in the premises will eventually bring about a healthier state of affairs elsewhere, as it has in Chicago, and manufacturers will thereafter have to compete on fair business principles, and do good work at fair profits, while losing less money in costly experiments.

Still, there has been a large amount of useless and unnecessary legislation in this matter. As was once said of a writer, "He puts too much water in his ink," so of laws and edicts relative to this wire business. But it must be remembered that the law-makers as well as the electrical people were green at the work when they commenced. Time will bring the balance right, and all will be benefited when the whole thing has crystallized and become permanent.

In the course of his work the other day, in a wire manufacturing concern in Chicago, the man in charge of the lamps had occasion to adjust one of these, which hangs directly over a pile of some tons of wire. The lamp, by the way, is in a dry cellar, and the dynamo was running. Stepping upon the wire, which lay upon a dry floor, in order to reach the lamp, he had no sooner touched the lamp frame than he received a very considerable shock. The circuit was perfectly insulated at every point, having an insulation resistance of over one megohm. Here was an anomaly which set the electrical heads whirling, and the conclusion was finally reached that the static capacity of the many tons of iron made a condenser of it, and it partially charged through his body. The hint should be sufficient to warn all interested of the possible danger which may arise in similar cases. An iron column, a metal pipe, or floor, might provoke the same sort of discharge. "Keep one hand in your pocket" while adjusting a live lamp, and wear rubbers where possible. Old hands in the business often wear greasy gloves with good results, and the plan is not a bad one by any means.

Electric lighting in Chicago is looking up as the Spring is advancing. The Fuller people are all ready for a start on a large scale on the north side. The United States people are wiring large incandescent plants close by the new Board of Trade, the Home, the Northwestern, and the Royal Insurance Companies' buildings, the Maller building, and the Palmer House barber shop rooms, a total of about 4,270 lights in all, besides some work without the city limits, and are doing the work in a very complete and satisfactory manner. They are endeavoring to make sample jobs of these, with every prospect of success. The Sperry Company are preparing for arc lights at the Board of Trade, and have re-organized their plant, which was knocked out of time by the Grannis Block fire. The Badger Company is as busy as a bee in a tar bucket. The Edison Company has, after a long struggle with a lot of old-fogy commissioners, concluded a contract for lighting the insane and county buildings at Wauwatosa, near Milwaukee, and are adding to the Pullman Building plant, while doing some other minor work; while the Van Depoele Company—well, they are, or rather the head of the concern is devoting much of his time and energies to the completion of a 50 horse-power motor, which, it is believed, will do most astonishing work. Mr. Van Depoele claims, and with good showing of reason, too, to have made a new departure in dynamos, by which he will be enabled to utilize a larger proportion of power than has heretofore been accomplished.

Speaking of utilizing power reminds one of some misstatements, which might be classed by an agriculturist as "Wood's colts." The assertion was made a year ago or so that six standard lights were run in Chicago by one-half of one horse-power; and, in fact, the indicated power of the engine, taken by a competent party, bore witness to the statement, which was published. But, lacking a photometer test, the table of results seemed rather leaky, to say the least of it. Other parties had fallen into the same trap before, and one who had been through a similar experience, and who stated that "the more lights we put on the easier the dynamo ran," smelled the mouse, and was even afraid the experiment would become known and render him ridiculous in the sight of electricians. Probably the world never will understand that mechanics never give something for nothing, and that a perpetual motion is an impossibility. The one-half horse-power story created some considerable stir, both in this country and in England, at the time, and capitalists went wild over the supposed facts for a few days; but the wonder died out, and the system seems to have gone where the body of Mrs. Hemans' little sailor boy hero went, when

> "There came a burst of thunder sound!
> The boy, oh! where was he?
> Ask of the waves that far around
> With fragments strewed the sea."

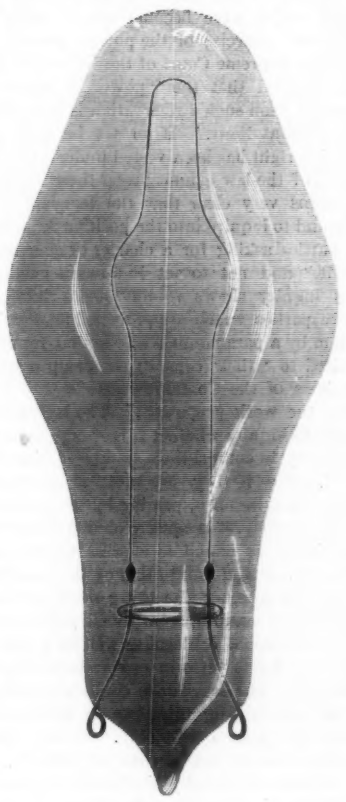

Fig. 16.

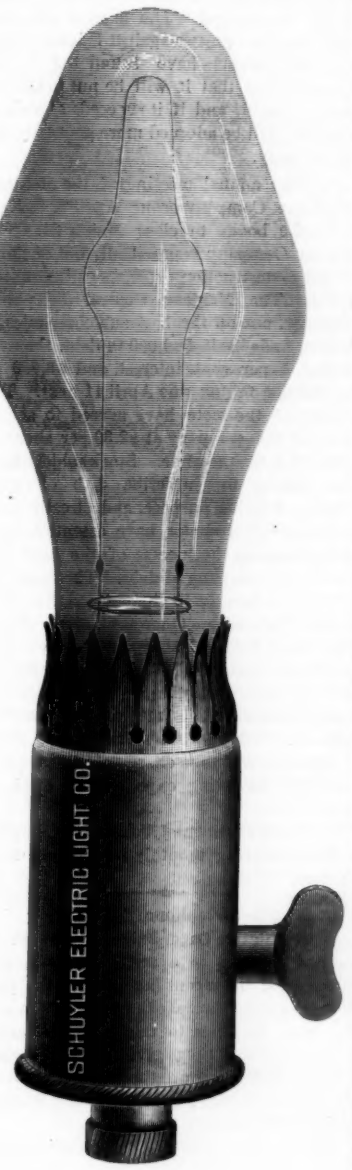

Fig. 15.

Incandescent Lamps and Socket.

The Western Electric Co. are pressed to keep up with orders for switchboards. Within the past week the City of Glasgow Exchange has ordered one similar to the Liverpool multiple board, with all the latest improvements. It is proverbial that "you can't shoot a joke into a Scotchman with a gun," but it is equally true that he "kens a gude thing when he puts his een on it," and he has certainly shown his good sense in this instance.

Gen. Anson Stager is confined to his bed at home, with what his friends fear will be his last illness. His trouble is Bright's disease of the kidneys, for which there is no specific. One by one the old, old timers are passing away, and the rank and file of earlier telegraphers, of whom he was one, are already largely numbered with the silent majority. They have signed their last "30," and closed their keys forever.

A novel application of the power of a magnet was lately made in a Scotch mine. Two shafts had been sunk, and it was desired to run a tunnel to unite the two at the bottom. Measurements were made, and directions carefully taken, but when the proper distance had been run the second shaft failed to connect. The engineer in charge decided to try what virtue there was in a magnet. Several bar magnets were framed together, end to end, and lowered the proper depth, while a vertical needle compass was carried to the farther extreme of the tunnel. As the magnet descended the declination of the compass needle located the direction, and in a comparatively short time the tunnel, continued in the indicated direction, was carried through the intervening wall.

An electrician tells an interesting experience of a friend of his, who was possessed of the only Edison pen in a city far removed from the manufacturer. The blessed thing refused to work one day when he had a hurrying job on his hands, and he was obliged to take it apart to put it in order. Nervous at the delay, he dropped one of the tiny screws on the plush carpet. He had been on his hands and knees in a fruitless search for it half an hour or so, and was not in the best of humor when the gentleman happened in to accompany him to lunch. The trouble was explained. A good sized horse-shoe magnet was procured, rubbed over the carpet once or twice, the screw picked up, the pen adjusted, the job worked off on time, and Col. Beetle was only too glad to pay for lunch for himself and friend.

NEW ORLEANS ELECTRIC LIGHT NEWS.

The Common Council of New Orleans has passed a resolution for the Committee on Fire and Lighting to contract with the Louisiana Electric Light and Power Company to light the suburbs of the city, or what is known as the "oil region," which is lighted at the present time with oil lamps. There had been considerable discussion over the matter, but the resolution was finally adopted by a vote of 23 to 7. The system to be used is the Jenney, of Fort Wayne, and the Star Iron Company's towers. The plant will consist of about twenty towers, 125 feet high, with six 2,000 candle-power Jenney lamps on each tower, and a number of other lights on poles or suspended in the streets. The whole number of lights will be 300. $1,200 is the contract price for each tower of six lamps, and $146 for each of the low lights per year.

The Star Iron Tower Company have six towers on the Exposition grounds, and the Jenney Company are running eight arc lights of 2,000 candle-power on each tower. This company is running about 250 lights in the buildings and grounds. The Brush Company has about 300 lights; Thomson-Houston, 140; and the Louisiana, E. L. and P. Co., 300. The last system is composed of Excelsior dynamos and Leavett-Muller lamps. None of the companies has received pay for running lights as yet, and some of them threaten to shut down this week if the money is not forthcoming. According to contract, some should be paid monthly and the others weekly.

Telephonic News

*** The bill making telephone and telegraph companies common carriers, was defeated by the Texas Senate on final passage.

*** The American Bell Telephone Company has declared its regular quarterly dividend of three per cent., payable April 15, books closing March 29 to April 12.

*** Glasgow, Scotland, is putting in the multiple switch-board in their telephone exchange. The equipment is for 800 subscribers, with a capacity for 2,000.

*** The Lord Mayor of London now talks with the Prefect of the Seine, Paris, through the telephone, chatting with as little difficulty as if they were in the same room, so says a Paris letter.

*** The city of St. Louis furnishes the telephone company 1,429 subscribers. There are a number of small exchanges in the suburban towns connected with St. Louis proper, making the total number about 1,600. Private lines are made much use of in this city.

*** Mr. L. M. Fishback, formerly superintendent of the Bell Telephone Company, of Mo., and more recently of the New Mexico Telephone Company, has accepted the position of general agent of the "Sunlight" carbons, Parker, Russell & Company, Manufacturers, St. Louis, Mo.

*** The Missouri and Kansas telephone people are substituting hard-drawn copper, No. 14, for galvanized iron, No. 8, in Kansas City, from the exchange to the city limits, thereby reducing the troubles from induction without increasing the resistance of their circuits. The result has been very satisfactory.

*** The Chesapeake and Potomac Telephone Company, have ordered five miles of the Patterson cable to be used under ground at Washington. The Central Union Company has ordered a mile of Patterson aerial cable to be used chiefly at Columbus, Ohio. There is quite a demand for the Patterson.

*** Mr. Call informs us that the Hudson River Telephone Company put up last week three-quarters of a mile stretch of phosphor bronze wire from Storm King Mountain to Breakneck Mountain, one mile below Cornwall, N. Y. By this route the line works well from Albany to Yonkers, and communication was also had with New York.

*** The Electrical Supply Company, Chicago, has received the general agency of the John Roebling's Sons Company's wire. Mr. Terry, the manager of the Supply Company reports trade in general supplies very good. Mr. J. H. Reid, of this company, returned Sunday from New Orleans and St. Louis.

*** The Kansas City and St. Louis citizens, who some months ago signed for telephonic service at reduced rates, said service to be furnished by means of telephones other than those controlled by the Bell patents, are asking when they may expect what was promised them. As yet they have no definite replies to their inquiries.

*** The New England Telephone Company will commence this week to run copper wire trunk lines out from Boston. A copper wire will be built to Worcester, Springfield and other points in the western part of the State. During the year this work will be very generally prosecuted, not only throughout the State, but in Maine, New Hampshire, Vermont and all other portions of its territory.

*** The courts have recently decided that where A, desiring to talk over the telephone with B, asked the operator to call him, and the operator thereupon had a conversation with B, reporting to A, who was standing by, what B said as it came over the wire, the Kentucky Court of Appeals held that in a subsequent action between A and B the former might prove by himself and others what the operator reported to him as coming from B, the operator being called and not remembering the conversation. Sullivan, et al, *vs.* Kuykendall, decided Jan. 22.

*** The telephone exchange at Rock Island, Ill., is being fitted up with a new and novel lightning arrester, planned by Mr. Charles Wilson, of the Central Union Company. Any unusual current fuses a fine wire which normally holds a plug in place which, in turn, presses a spring from the ground contact. The wire fusing releases the plug and spring, and the electric charge goes to the ground. The head of the plug where the wire presses against it is insulated. The experiments have found the device of such value that it will be put in the exchange named, and if it succeeds as well as expected, will be adopted more generally by the company.

*** The annual meeting of the Mexican Telephone Company occurs April 8, in New York, the books to close March 21. The Mexican Company is practically out of debt, but finds construction expenses eating up the profits. The Mexican Central Telephone Company, one of the best sub-companies in Mexico, finds itself $20,000 in debt, the note bearing 5 per cent. interest, and $6,000 of the amount falling due April 11 next. The holders of the note have agreed to accept stock of the company at $2.30 per share in liquidation of the same. Stockholders have been invited to subscribe $\frac{1}{5}$th of their holdings for this purpose, and already some 40,000 or 45,000 shares have assented, practically insuring the success of the plan and freeing the company of debt. The company has five exchanges in Guanajuato, San Luis Potosi, Zacatecas, Queretaro, and Aguas Calientes. By the last report, nearly a year ago, the company had 316 paying subscribers and 400 sets of instruments. The annual report next month is expected to show an increase. It is understood that a new board of directors will take charge of the property in April, including experienced telephone men.

The Inter-continental Telephone Company is now receiving monthly remittances from Caracas.

The Telephone Contest.

Representative Greenhaige, of Lowell, requested answers to a series of questions at the close of the recent hearings on the petition to compel telephone companies to give the same facilities to the other telegraph companies that they give to the Western Union. Following are the answers prepared by George S. Hale, counsel of the Western Union Company:

The general scope of these inquiries seems to be whether the legislature of Massachusetts may ignore private rights and contracts in a statute affecting corporate business in which the public has an interest, or if that business is transacted by means of rights and instrumentalities granted and protected by the Constitution and laws of the United States, whether the legislature need consider or regard a claim that the proposed statute interferes with these rights, or is bound to frame its legislation so that it will not so interfere. If this is a fair statement, the answer seems to be obvious. But, taking the questions literally in the form proposed:

(1.) "Is the legislature bound to inquire into the position occupied by parties asking for a charter, or chartered by it?" Except as to their capacity to comply with the laws of the Commonwealth and to perform the work proposed, it would seem very clear that it *was* so bound if anything is brought to the attention of the body itself (or of its committee as its "eyes and ears") showing that the "position" referred to gives rights or imposes duties created or protected by a paramount authority. Our statutes carefully provide (Public Statutes, chap. 2, sect. 5,13) for notice of any proposed legislation affecting the rights or interests of individuals or of private corporations, or asking, altering or extending the charter of any corporation (sect. 7), also that particulars as to a new charter shall be given, and that any such alteration be specified—provisions which would be obviously useless if it were not intended that the legislature should inquire into the "position occupied by the parties" and their consequent rights. And the Supreme court of this Commonwealth has expressly declared that "in granting new charters or enlarging, modifying or renewing old ones, and in a large portion of ordinary legislation, it is the duty of the legislature to inquire and ascertain whether existing facts render their action expedient or necessary." The right to amend, alter or repeal an act of incorporation (reserved by Public Statutes, chap. 105, sect. 3) cannot and does not authorize the legislature to disregard the position in which the corporation in question, or any person or corporation holding rights under or acquired from it, stands by virtue of the rights already granted; and while the legislature may make any alteration that will not (1) "defeat or substantially impair the object of the grant or any rights which have vested under it, and (2) that the legislature may deem necessary to secure either that object or other public or private rights;" yet "when under a power in a charter rights have been acquired and become vested, no amendment or alteration of the charter can take away the property or rights which have become vested under a legitimate exercise of the powers granted." And the Supreme Court of the United States has declared that the "power to legislate founded upon such a reservation is certainly not without limit." If an act be done by which a right has been vested under a law, a repeal of the law cannot divest these rights. It seems very clear that the legislature is "bound to inquire into the position occupied by parties asking for a charter or chartered by it," and not to act in a manner which that inquiry shows would violate rights of those parties which are protected against its action by a paramount law. Is that inquiry limited to "their capacity to comply with the laws of the Commonwealth and to perform the work proposed?" The legislature ought to inquire whether it is "expedient or necessary to compel them to do the thing desired, even if they are not incapacitated from doing it. But, passing by the question of expediency, it is equally obvious that the legislature is bound to inquire into its own capacity, as well as into that of the corporation, and whether the thing desired is one which any natural or artificial person has a constitutional or legal as well as a physical capacity to perform or refrain from performing. The legislature could not compel a railroad company to violate its contract to carry the mail on Sunday. If any State statute should make that an offence, it "would not be legally binding on any court of justice," nor could such a statute prevent an express company from performing interstate transportation on that day; and this is because it is an interference with a federal right, power or duty. In such a case it would not be sufficient for the legislature to inquire whether a railroad corporation had the capacity to stop running trains on Sunday. It must inquire whether it might not have the legal capacity to refuse to comply with such a law, or to refuse to omit the work forbidden or might not be (as between it and the United States), without the legal capacity to obey the law. A person or corporation (1) may be capable of performing an act or obeying a law which on the other hand it may have the right to refuse to perform or obey, or (if other parties have contract rights) (2) may not have the legal capacity of taking away from such parties without their consent, an exclusive right which it might otherwise give to all others. In one sense these are questions of "capacity," but not in another.

(2) "Where the corporation undertakes a public duty, does the legislature concern itself with the question of patents as they may enter into the machinery used by the corporation?" Certainly it will not be claimed that, if the corporation has become the owner of a patent which enters into the machinery used by it, the legislature could take away from the corporation the right to that patent, or compel its sale, surrender, or transfer to another corporation for its exclusive or common use at such a price as the legislature thought fit to fix. The legislature may order a railroad corporation to provide safe and suitable brakes, car couplers, etc., and need not concern itself with the question whose patent covers the machinery it selects. It may order one railroad to give equal facilities to connecting roads, but it cannot, under that authority, order it to sell its patent rights or its coal, or to lease its cars to all connecting roads at the same price. Nor if the corporation, as the absolute owner of a patent, has granted to one connecting road the exclusive right to use that patent on its cars in this State or in a section of it only, or for a special or limited purpose, could the legislature take away this exclusive right from the grantee and compel the grantor to grant a like (common) right to a third corporation. The legislature therefore does and must "concern itself with the question of patents" if it undertakes to pass acts which directly or by inevitable implication relate to the patents owned by a corporation and the rights of the owner therein. It must be observed that we speak of the patent or invention, and not of a patented article which has been manufactured, sold, and delivered by the owner or licensee without exclusive provisions. After a patented article has been manufactured and thrown out, as it were, by sale into the common mass of property, it is subject to the ordinary rules relating to that property (see Bloomer *vs.* McQuewan, 14 How, 539, 549). But the very essence of the right or interest in an invention secured by the Constitution, laws, and patents of the United States is the *exclusive* control reserved to the owner (whether the original patentee or grantee), by virtue of which he can give or refuse it to all or to such as he desires to select, with or without reason, cause, or explanation. This right, indeed, does not impair the legislative power to protect the life and health of the community, but the case we are considering relates to something of which it is proposed to compel the allowance on terms dictated by a legislature of a general use as of supposed benefit to the public. "When the corporation undertakes a public duty," the legislature cannot for that reason compel it to perform another public duty or to devote to that duty for public use (without compensation) any private right or property which it could (otherwise) rightfully reserve for itself or for specified grantees by virtue of an exclusive right expressly granted by a paramount authority, but which it has not so devoted to such public duty or use. To what extent, then, has the American Bell Telephone Company devoted its property to a public use? We answer the inquiry in the words of Mr. Justice Story: 'In all these cases the nature and extent of the employment or business, which is authorized by the owners on their own account and at their own risk, and which either expressly or implicitly they hold themselves out as undertaking, furnishes the true limits of their rights, obligations, duties and liabilities. The question, therefore, in all cases of this sort is, what are the true nature and extent of the employment and business in which the owners hold themselves out to the public as engaged? They may undertake to be common carriers of passengers, and of goods and merchandise and of money, or they may limit their employment and business in the carriage of any one or more of these particular matters." Our position is, that under the contract between the telephone and telegraph companies, and between the former and the exchange or sub-companies, it agrees not to license and does not license or devote to the public, the use of its patents in competition for the purpose in controversy.

(3.) "Is not the question to be considered by the legislature simply upon what terms and conditions the charter shall be granted, and how the business shall be conducted, especially with reference to the public?" If we omit the word "simply," the answer is yes; but, in considering what these terms and

conditions should be, the right of individuals and corporations who are also part of "the public," and the broader interests of "the public" involved in the obligation to recognize those rights and observe fundamental rules of law must be regarded. It may be a good thing for the public in one sense (if by that is meant *the majority*) to compel a corporation which has accumulated a large capital and surplus to expend it all in serving that public without compensation; but the legislature is not to consider that "*simply*." Common justice and the rights of property in individuals are also to be considered and respected. The act now asked for is designed specifically to compel one class of corporations interested in a patent to allow its use to another class for the pecuniary profit of the latter without discrimination between those of the latter class as to the mode or purpose of the use, or as to compensation therefor. It is the duty of the legislature by its committee to inquire and ascertain whether existing facts render this action expedient or necessary, whether it is within the limits of their constitutional power as to the conduct of the business whether, even if it were otherwise reasonable, it is so under the existing rights of the parties; and whether if, even if is within the power of the legislature, it is just or expedient to legislate actively against one corporation for the pecuniary benefit of another?

The New Postal Law.

One of the laws that was passed in the closing hours of the last Congress, and received the approval of the President on the morning of Inauguration Day itself, was one known as the quick delivery postal law. It provides that the Postmaster-General may designate "special delivery" offices at any free delivery office, and at any city, town or village containing 4,000 people; that a special 10-cent stamp affixed to any letter in addition to the regular postage, shall entitle such letter to immediate delivery, within one mile of any post-office so designated as a special delivery office, at any time between 7 o'clock in the morning and midnight.

A receipt book will be kept like those used by telegraph companies, and a record of the number of such letters will be kept by the postmaster. The special messenger is to be paid out of the extra postage, but in no case is to receive more than $30 per month. This system may be found of some use in cities, where such specially stamped letters may to a certain extent take the place of a district telegraph. It has a powerful rival in the telephone, however, for local uses; and for long distances it cannot of course compete with the telegraph. The bill was introduced and pushed through by Congressman Skinner, of Jefferson county, New York.

*** The following is the annual statement of the treasurer of the American Bell Telephone Company, issued in advance of the annual report. The report this year is for the 10 months from March 1 to Dec. 31, 1884:

STATEMENT OF ASSETS AND LIABILITIES, DECEMBER 31, 1884.

Assets.		
Telephone	$558,319.51	
Stocks	22,125,173.36	
Merchandise and machinery	18,851.23	
Lines	102,270.55	
Bills and accounts receivable	681,493.74	
Cash and deposits	520,536.33	
Liabilities.		
Capital stock		$9,602,100.00
Loan of 1882 (convertible)		3,000.00
Bills and accounts payable*		516,925.81
Patent account (profit and loss)		9,540,120.31
Profit and loss		3,225,478.63
Reserve		61,297.59
Surplus		1,057,112.43
	$24,006,644.77	$24,006,644.77

* Of this amount, $288,063 is the dividend payable Jan. 15, 1885, to stockholders of record Dec. 31, 1884.

COMPARATIVE STATEMENT OF EARNINGS AND EXPENSES.

	1883–4. (12 months.)	1884. (10 months.)
Earnings.		
Rental of telephones	$1,695,678.58	$1,636,848.64
Sales of instruments and supplies	17,969.59	5,803.55
Royalty from manufacturer	4,837.74	
Dividends	440,923.00	317,887.30
Commission from extra-territorial and branch lines	45,819.68	58,109.15
Commission from telegraph business	12,305.81	11,290.10
Interest	78,059.67	38,604.73
	$2,295,594.07	$2,067,543.97
Expenses.		
Expenses of operation	$172,909.69	$193,553.59
Legal expenses	129,893.22	124,809 25
Interest and taxes	125,882.89	33,710.25
Depreciation	24,120.69	98.24
Commission	354,856.21	325,207.19
Royalty	12,500.00	10,000.00
Total	$820,162.70	$687,378.52
Net earnings	$1,475,431.37	$1,380,165.45
Balance of income from previous year	168,081.54	348,884.17
Miscellaneous items to surplus account	91,291.87	34,918.45
Total	$1,734,804.18	$1,763,968.07
Dividends declared	1,051,479.00	1,152,252.00
Extra dividend, Dec. 15, 1884		288,063.00
Carried to surplus account	334,441.61	323,653.07
Balance to income account	348,884.17	
Total	$1,734,804.78	$1,763,968.07

WILLIAM R. DRIVER, Treasurer.

Boston, Jan. 31, 1885.

N.B.—The above statement shows the business for 10 months. Previous financial years ended Feb. 28. Future financial years will end Dec 31.

.... The Western Union Telegraph Company exchange, at the rate of an eighth of a cent per pound, about one hundred tons of old and rejected wire every year. This wire costs the company from seven to eight cents per pound—sixteen feet to the pound. The company calculates from five to seven years as the life of a wire. The wires last much longer in a dry climate than in a moist one. Wires strung along the coast are often found incrusted with a salt deposit, which in the course of a few years will cause much trouble to the operators, and if a storm occurs, the weight upon the wires will cause breakage to ensue, which is often charged to the severity of snowstorms.

.... A curious installation of overhead telegraph lines, says London *Engineering* has been lately completed in Cochin China by the French Administration. As is well-known, the river Mekong cuts Cambodge and Cochin China in two. This magnificent river has regular floods of nearly 40 feet in height, which last four or five months each year, and during these periods the currents have a terrific velocity, destructive to almost everything on the banks or in the stream. Heavy telegraph cables, sunk each year at low water, are regularly carried away by the floods, rendering communication almost impossible during a considerable portion of the year. The engineer in charge of the lines recently decided to fix on each side of the river, at a spot where the width is 2,560 feet, posts 165 feet high. Silicious bronze wires are suspended from these posts across the stream. Bronze wires of another type had previously been used, but these were destroyed by lightning, which stretched them considerably and reduced their diameter to such an extent that their resistance gave rise to considerable heating when an atmospheric discharge traversed them. Since these wires have been replaced by others of silicious bronze, no mishap has occurred, and during the last flood direct communication across the river and between the terminals of the line was maintained for the first time since a telegraph station had been established at Saigon. At the present time the high posts referred to above carry two wires of silicious bronze, one .04 in., and the other .055 in. in diameter. A similar crossing has been also completed over a broad tributary of the Mekong, the span of which is 1,670 feet. The height at which the wires are suspended leaves sufficient room for steam vessels navigating the river to pass, the clear headway in times of flood being 114 feet, and at low water 154 feet.

.... The condition of the Mexican Telegraph Company, as shown by a report to the shareholders by President Jas. A. Scrymser, is very flattering. The receipts from January 1, 1881, to December 31, 1884, were $700,459.30, and the expenses but $224,890.44. Dividends of 8 per cent. were paid during the last three years, amounting to $301,826.68, and the total surplus, after paying these dividends, was $173,742.18. Of this amount $109,078.90 was applied to construction and investment, leaving a net surplus on December 31 last of $64,663.28. The estimated net receipts for January were $11,000, and the dividend payable February 11, $57.376, leaving a surplus beyond the dividend of $18,287.28. The original stock of the company, issued in 1880, was $1,000,000, which was all taken. This was increased in 1882 by $200,000, and in 1883 by $300,000. All the shares of the last two issues have been taken but 656, which still remain in the treasury of the company. In addition to this stock, which, estimated at par, is worth $65,600, the company owns 1,362 shares of the stock of the Central and South American Telegraph Company, which cost $127,450. These figures show the results of the operations of the company for three years and ten months from the beginning of its work on March 3, 1881. The president, in his report, says that the operating expenses of the company average only 32$_{10}$ per cent. of its receipts; semi-annual dividends have been maintained at the rate of 8 per cent. per annum, and the annual surplus, it is expected, will provide amply for any emergency The cables have not cost anything for repairs, and are believed to be in as perfect a condition as when laid. The receipts of the company have been well maintained in spite of the dullness of trade, and a large reduction in the tariffs. The original capital provided for 476 miles of cable. The increased capital, with surplus earnings, has provided for the Galveston extension, consisting of 362 miles of cable, for the iron post land line, connecting Vera Cruz with the City of Mexico, 267 miles in length, and has paid for 1,362 shares of the stock of the Central and South American Telegraph Company.

.... The United States Commissioner of Railroads has decided, in regard to the application of the Baltimore and Ohio Telegraph Company for equal facilities with the Western Union Company over the wires of the Union Pacific and other land-grant railroads, that the companies, in granting existing facilities to the Western Union, have not violated the provisions of the various acts of Congress in regard to the same. The Baltimore and Ohio Telegraph Company has accordingly returned to the charge, in the form of an extended letter from Mr. Bates, its president, to Commissioner Armstrong, upon which the commissioner is to give the matter a rehearing.

A comparative statement of the estimated net revenue of the Western Union Telegraph Company for the quarters ending March 31, 1885 and 1884, shows the effect of dull business and competition:

	1885.	1884.	Changes.
Net revenue	$1,350,000	$1,650,000 Dec.	$300,000
Interest and sinking fund	143,500	126,420 Inc.	17,080
Balance	$1,206,500	$1,523,580 Dec.	$317,080
Dividend, 1½ per cent	1,199,835	*1,399,800 Dec.	199,965
Balance	$6,665	$123,780 Dec.	$117,115
Surplus, Jan. 1.	4,231,667	3,970,931 Inc.	260,736
Total surplus, April 1	$4,238,332	$4,094,711 Inc.	$143,621

*1¼ per cent.

.... A complaint has been filed by Arthur D. Payne, of Providence, R I., in the Clerk's office of the United States Circuit Court against the American Rapid Telegraph Company, of Connecticut, *et al.* This bill of complaint is brought by Mr. Payne and all other holders of interest coupons of the first mortgage bonds of the company, in Connecticut and in other States, for failure to pay the interest on the coupons, of which the complainant holds ten. The bill asks for the appointment of a receiver during the pending of the suit, and that an injunction may be issued restraining the defendants from interfering or disposing of any of the mortgaged property, and that a writ of subpœna be granted to the complainant, to be directed to the telegraph company, to appear and answer the bill of complaint. The bill is returnable April 6.

TELEGRAPHIC

.... "Charge," is the cry of the battery and the dude—the latter for clothes to wear, the former to prevent wearing close.

.... A change has been made in the receivership of the Bankers and Merchants' Telegraph Company, which it is understood will be favorable to the re-organization of the concern and the carrying out of the arrangements between that Company and the Postal Telegraph Company.

.... The Baltimore & Ohio Telegraph Company announce the completion of their line to New Orleans. They have opened offices at that place and are now ready to handle business promptly, at reduced rates. Other important places in Louisiana and Texas will be opened in a few days.

The statement of the Western Union Telegraph Company for the quarter ending March 31 is as follows, with February and March partly estimated:

Net revenue for quarter	$1,350,000
Interest and sinking fund	143,500
Balance	1,206,500
Dividend of 1½ per cent	1,199,835
Balance	6,665
Surplus, January 1	4,231,667
" April 1	4,238,332

A dividend of 1½ per cent. was declared, payable April 15. Books close March 20, and re-open April 2.

.... Daniel S. Robeson, a stockholder in the American Rapid Telegraph Company, in behalf of himself and other stockholders similarly situated, has filed a bill in equity in the United States Circuit Court, in Boston, against the company, Anthony W. Dimock and others charging that the defendants have made undue preferences and created liens on the property and assets of the company in favor of the Bankers and Merchants' Telegraph Company, and asks for an accounting between the two companies and the appointment of a receiver of the American Rapid Telegraph Company. A restraining order has been issued by the court.

.... Reuben A. Weeks, a lineman of the Bell Telephone Company, of Philadelphia, had two fingers of his right hand and the thumb of his left hand burned by electric wires last week. He was on a pole tightening wires, and thinking it perfectly safe in daylight he caught hold of an electric light wire. The shock rendered him unconscious. He hung on until his fingers were badly burned, when he fell and was caught on a wire by the strap of his climbers. He remained suspended in the air, head down, for several minutes, until a ladder was procured and he was rescued. When brought down he was still unconscious, and was taken to the hospital, where he was soon restored to consciousness. One finger was burned entirely off, and the other and the thumb were amputated.

.... Considerable interest is manifested in the report that Edward S. Stokes, of the Hoffman House, was chiefly instrumental in the change of receivers of the Bankers' and Merchants' Telegraph Company. At a meeting of the bondholders it was stated that Mr. Stokes had advanced the company $419,000 on receiver's certificates. It has been the impression on the street that Mr. Stokes represented Mr. John W. Mackay, president of the Postal Telegraph Company, but this is declared to be incorrect. He represents, it is said, A. J. Baldwin, president, and J. Henry Miller, secretary of the Bankers and Merchants' Construction Company. Mr. Miller resides at the Hoffman House. The stock and bond holders have postponed action in foreclosure proceedings in order to obtain a copy of the statement filed by the late receivers. It is understood that their counsel will ask for an extension of time in which the action can be brought.

ELECTRICAL AND SCIENTIFIC

* * The first electric railway opened in the United Kingdom was that between Partrush and the Causeway. Ireland will soon possess a second line. The Bessbrook Spinning Company are constructing at their own expense a tramway from Bessbrook to Newry. It will be opened in a few weeks.

* * Mr. D. H. Bates, general manager of the B. & O. Telegraph Company, was in Chicago last week arranging with General Superindent Zeublin for the new quarters of the company in that city. The general offices will be moved from their present location on Washington street to the new Board of Trade building, and the main operating room in a convenient location near the same building.

* * The Hessey Electric Railway Company, of Kansas City, will give their scheme a trial about May 1st. The two wires used by them are carried on poles running on both sides the street railway, the wires being supported over the center of the tracks. The parties interested possess the usual sanguine hopes, and think they have found it. Somebody will, or has, they say, and why not Kansas City ?

* * The quantity of copper imported by England from America has greatly increased during the past three years. In 1882 the quantity was only 745 tons, which rose in 1883 to 9,410 tons, and last year to as much as 17,309 tons. This is the more remarkable as, so recently as 1880, America has had to import from Chili to meet its home demand. Australia is said to have produced about 10,800 tons in 1884, 9,700 in 1883, and 9,800 in 1882.

* * It is claimed that the Edison Company is preparing to run by electricity the cars on the Second avenue elevated road in New York, and expects to have them running in April. There will be a motor under each car, and all of them will not weigh more than the present locomotive. The Daft Company has laid the third rail from Fourteenth to Fifty-third street on the Ninth avenue line. The electricity, in making the test on this line, will be generated by two fifty-horse dynamos, the force of the electricity to be 200 volts.

* * Successful experiments have been recently made at Cincinnati with the new electric railway brake. The trial was made with a heavy coal train of ten cars, each car weighing, empty, about eleven tons and having a tonnage capacity of 40,000 pounds. The loaded train, with full steam on, was put to a speed of forty-eight miles per hour on a down grade of sixty-eight feet to the mile, and brought to a dead stop in thirty-seven and one-half seconds after putting on the brake, the distance run in that time being 445 yards, exact measurement. The brake acts automatically in case the train should part, and signals both cab and caboose and applies the brake to the rear portion, still leaving the engineer with complete control of the forward portion.

* * The following claims of superiority over steam traction are made for electricity as a railway motor: Absence of smoke and cinders; it obviates all danger from explosion; it does away with the necessity for heavy locomotives and for tenders, and allows of lighter bridges and tracks; the rails are not worn out so fast, as a perfect rotary motion is communicated to the driving wheels, and there is no pounding or jumping of the motor; no obstruction can throw the train from the track, as the current is neutralized by the obstruction itself, and the train comes to a stop before the obstruction is reached. A broken rail or an open draw-bridge would break the current, so that the train could not reach the point of danger; by a proper arrangement of connections it would be impossible for any train to proceed to a section already occupied by another train, and collisions would be impossible.

FIG. 11.

FIG. 12.

INSIDE ARC LAMPS.

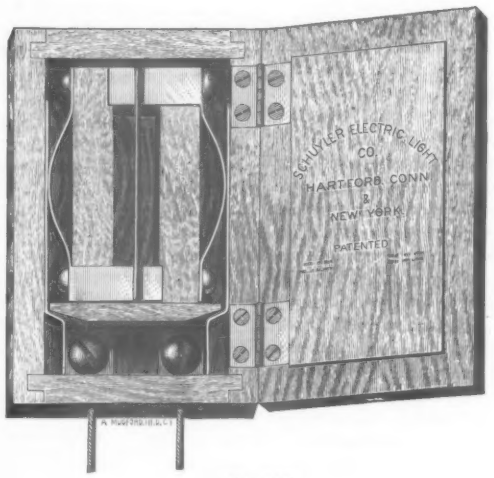

FIG. 17.

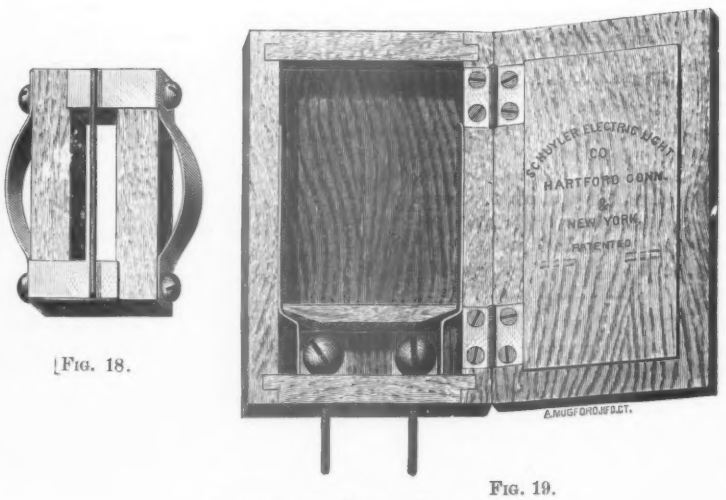

FIG. 18. FIG. 19.

INCANDESCENT SAFETY FUSES.

Economy of Fuel.

The Brockton Electric Light Company, Brockton, Mass., have in use the Jenney and the Thomson-Houston Company system of arc lights. They run their dynamo-electric machines by belting direct to Armington & Sims engines.

These engines have two wheels instead of one, as in the case with the old style long-stroke engines. It has been the policy of the Brockton Company, ever since it started, to utilize every means to add to the profit of their investment. They use one wheel of their engine in the day time to run the shafting of a shoe factory in the building over their station, and in the winter months both the shoe factory and the electric lights are running at the same time. The company have always considered in selling electric lights they were selling power, and acting on this supposition, they have been experimenting on various kinds of fuel. They use, to make steam, a steel tubular boiler, set with the Jarvis Patent Boiler Setting, and have up to the present time burnt a mixture of screenings and soft coal for fuel. Recently they have experimented with wet sawdust and soft coal, and find they can now run their station and do all of their work with 600 lbs. of soft coal mixed with a cord of sawdust, that costs them about fifty cents delivered.

Selling electric lights is selling power. The cheaper this power can be produced, the more money will be made by electric lighting companies.

Mr. Charles Selden, of the B. & O. Co , and the inventor of the sextuple telegraph instrument, is sojourning at the Hot Springs recuperating his strength. His friends will be glad to see him back in good health and spirits, and all will be willing to congratulate him that he escaped so well after his debut with the sextuple.

* * Sections XIX., XXIV. and XXVII. of the supplement to the "Journal of the Franklin Institute," in the report of the examiners appointed in connection with the International Electrical Exhibition, have been issued. They cover the subjects of electric telegraphs, electro-dental apparatus and the application of electricity to warfare. Among the telegraph apparatus mentioned are the automatic chemical Roman letter, in which an ingenious mechanism, obeying the touch of a key in a key-board like a piano, stamps a letter on chemically-prepared and perforated paper. The advantage gained is rapidity of communication. In the automatic chemical with the telegraph alphabet one thousand words a minute have been written with a wire one hundred miles long between New York and this city. Yet these methods, however, have not yet superseded the ordinary process, owing, it is said, to a difficulty inherent in the principle adopted. The dental applications of electricity include mouth lamps and mirrors, filling mallets, driven by mechanism, imitating the movement of the human hand and arm, the helix and electrode for benumbing the nerves during operations, and motors for use in running dental apparatus. For military use the committee report on search lamps of 4,000 candle-power, a steamship projector and focusing lamp of 7,222 candle-power, the light of which one man can throw in any direction as a beam or disperse over a large area at will, and a torpedo detector with a sinker which, on coming into contact with any mass of magnetic metal at the bottom of a stream, bay or inlet, where a boat with a receiver on board is slowly rowed, transmits to the receiver a sound indicating the presence of danger.

* * The following Philadelphians have been appointed members of the American General Council of the proposed American Exhibition in London in May, 1886: Professors J. P. Lesley, President Chas. Phillips, of the Columbian Bank; W. Masters Camac, Esq.; Jerome Carty, Esq.; General C. H. T. Collis, Ralph F. Cullinan, Esq.; Samuel P. Godwin, Esq.; Simon Gratz, Esq.: George Harding, Esq.; Professor Joseph Leidy, Edward Shippen, Esq., and Joseph M. Wilson, Esq.

An Electric Railway.

Work has been begun on the Baltimore & Hampden Railroad, which will be a suburban branch of the Union Passenger Railway Company. The new road will start from Huntingdon Avenue and Oak Street, Baltimore County, and pass through the villages of Mt. Vernon, Hampden, and Woodberry. The iron for the tracks has been distributed. It is the intention of the company to use electricity as a motive power in running the cars, modeled on the system in use on one of the long piers at Coney Island. The electric conductor will be a third rail laid in the center of the regular rails. The cars will be drawn by motors with electric machinery. The contact between the electric rail and the motor is by a wheel, which runs over the rail, picking up the electricity. A motor, independent of the cars, is being made to try the experiment, and, if it is successful, it is likely that the future motors will be part of the cars, so that one man may run the motor and act as collector of fares, too. It is claimed for the new system that it will be cheaper than horses; that there will be no noise, no smoke, and no cinders, and that it will make from eight to ten miles an hour. The pressing of the finger against a button is all that is required to manage the motors. General Superintendent Robbins says that if the experiment turns out all right on this branch road, with its steep grades, the system will work satisfactorily anywhere. The length of the new road is 2½ miles, and it is expected to be ready for use about the middle of April.

The latest project reported from France is the erection of a granite tower in the garden of the Tuileries *three hundred and sixty meters* high, from the top of which it is proposed that one hundred lamps, each of twenty thousand candles, shall cast their rays upon the surrounding darkness. The estimate for this plant included engines of ten thousand horse-power, and mammoth reflectors which shall project all the rays in a downward direction, but at varying angles. This is the tower system run mad—a scheme so absurd that it is hard to believe that any one seriously proposes it. But it is published in reputable electrical journals in France, not however, without words of caution and criticism. Leaving all the electrical part of the scheme out of the case entirely, when French engineers succeed in building a granite tower three hundred and sixty meters—nearly twelve hundred feet—high, it will be one of the greatest, and certainly the tallest, of the modern wonders of the world, and, unless something decidedly novel in the way of granite is discovered, the foundations will be crushed to powder long before the desired height is attained. Paris was the first city to use the electric light. After much experiment, it practically abandoned it, and now, benefiting by further experiment elsewhere, especially in America, it is seeking to return to its use. Doubtless it will do so, and the method will, in all probability, differ but little from that in vogue in other parts of the world, except that the plants will probably be small and numerous, each furnishing lights for half a dozen blocks at the utmost. This will get rid of overhead conductors, and also of underground conductors, except from one side of the streets to the other.

—— The arrangements for a consolidated electric company which are being matured by President Goff, of the American Electric and Illuminating Company, of Boston, are being rapidly consummated. Mr. Goff, with several of his co-directors, have been in New York in consultation with their attorneys and those who are to be their associates here, regarding the new company's plans, and arranging terms for the consolidations which are to take place. The new Board of Directors will be selected with especial reference to their business qualifications and financial strength, as well as their ability to render Mr. Goff substantial aid in the management of the business of the company. The executive offices will be in the Western Union Telegraph Company's new up-town building, on the corner of Twenty-third Street and Fifth Avenue, opposite the Fifth Avenue Hotel. The offices are to be ready for occupancy next month.

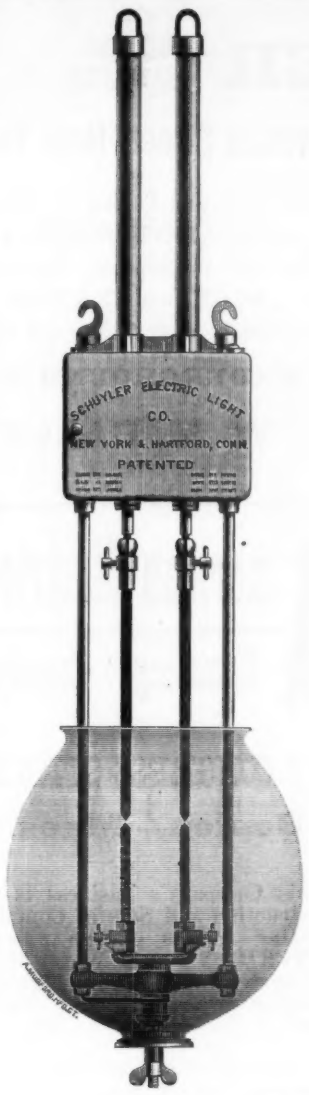

FIG. 13.

FIG. 14.

DOUBLE LAMPS.

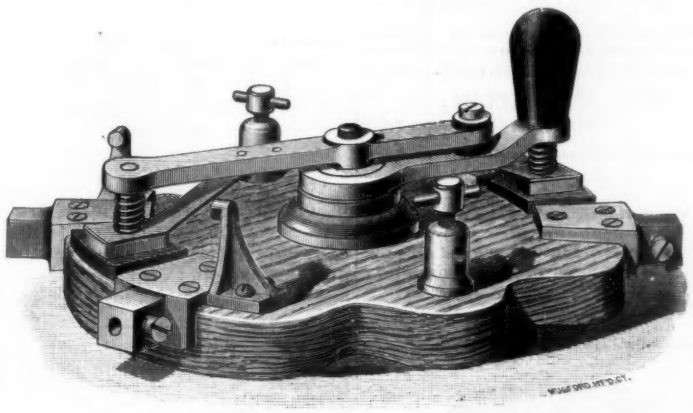

FIG. 21.

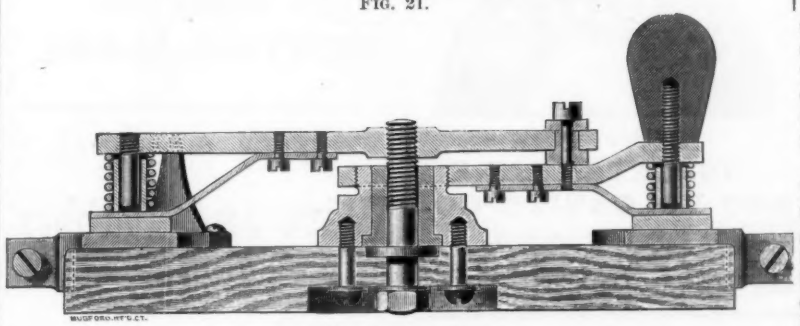

FIG. 20.—DOUBLE SWITCH.

—— The Brush Electric Company, Cleveland, Ohio, have received an order from the Providence and Stonington Steamship Company, to light their steamers, Massachusetts and Rhode Island, with the Swan incandescent lights. Brush self-regulating dynamos will be used, and driven by Armington & Sims' special engines, designed for this purpose. This Company has recently put in two engines on the steamers Pilgrim, Bristol, Providence and City of Worcester.

—— The Edison central station in New York for the distribution of electricity for incandescent lighting has been in continuous operation for two years and a-half, with the exception of a stop of about two hours. The use of the lamps is less than two and a-half hours per day, and the operating expenses 1⅞ cents per lamp per day. The price charged is on the basis of gas at $2 per thousand, and during the year 1883, the station earned 3 per cent on the investment.

—— The firm of Morgenthau, Bauland & Company, Chicago, are putting in a 40-arc light plant of the Western Electric Company.

ELECTRIC LIGHT NEWS

—— The Boston girl said she didn't like the improved electric light because there was no sparking." She was consoled on finding there was a "belt" at the works.

—— At Newport, R. I., a large electric light plant is being put in to light the city. Armington & Sims engines are being used in the equipment, with the Skinner and Wood boilers.

—— The Mobile Electric Light Company, of Mobile, Ala., are putting in a new electric light plant, in which they use the Ball engine in connection with the Thomson-Houston system.

—— The following general alarm was sent to all the police stations in the city one day last week: "Complaint is made that persons are stealing wire from electric light poles, which is probably done between 5 and 8 A. M. Direct members of your command to look out for them."

—— Grand Island and North Platte, both in Nebraska, are being supplied with an electric light plant of 40 arc lights, each of the Sperry system. The local company at Grand Island is named the Sperry Electric Light and *Gas* Company, a combination that should be capable of furnishing light to order. There is the dawning of a new era when the electric light and the gas interests unite to give light, instead of endeavoring each to destroy the other.

—— At Detroit, Mich., Levi T. Griffin, C. E. Warner, W. G. Latimer, W. B. Hayes and E R. Barron have formed a Van Depoele Construction Company with a capital stock of $50,000. The object is to handle the Van Depoele system in Michigan. This includes all motors, electro-plating machines, arc and incandescent lights, etc. The officers are as follows: President, J. E. Wyman; Vice-President, W. B. Hayes; Secretary, W. G. Latimer; Treasurer, C. E. Warner.

—— The Brunswick Hotel, Kansas City, Mo., is getting some free notices on account of the abundance of electricity lying around loose in it. If a guest happens to touch a radiator or gas fixture, or any conductor to the ground, he immediately receives a shock that makes him smile. Everything seems heavily charged, not excepting the bill. So far the source of the unusual supply of electricity remains undiscovered.

—— Underneath the approach to the East River Bridge, on the New York side, there is a court or yard in which day and night are literally reversed. The bridge supports shut out the sunlight, while the electric lights burning on the bridge at night make the court nearly as light as day. The people residing there being, of course, poor, are unable to pay for gas or oil in order to see to work when other people do, so they sensibly do their sleeping then and their work at night by the electric light, which costs them nothing.

—— St. Louis is pretty thoroughly shaken up over the question of lighting the city, and the gas company is receiving an investigation that brings to light some transactions not altogether lovely. It is more than likely that part of the city will be lighted by electricity very soon, and that the electric light will be given the supremacy where the gas monopoly has so long ruled the day, and the night. Petitions to the Council against the renewal of the gas company's franchise are pouring in, over 1,500 signatures having already arrived, and every mail bring additions. The signatures appended belong to all classes of people, merchants, lawyers, ministers, saloon keepers, manufacturers, doctors, etc., with a very fair sprinkling of ladies. Many of the signers were not content with simply subscribing to the petition, but added sentiments to the subscription, among the more emphatic of which were, "D—n the gas monopoly." "Give us competition every time," "Give electricity a chance," "Down with corruption," and so forth

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MARCH 17, 1885.

313,884 Dynamo Electric Machine and Electric Motor; Anthony Reckenzaun, London, England, assignor to Frederick Reckenzaun, New York, N. Y.

313,894 Armature for Dynamo-Electric Machines; Wm. Stanley, Jr., Pittsburgh, Pa.

313,941 Electric Bell; Charles E. Kells, Jr., New Orleans, La.

313,965 Holder for Incandescent Electric Lamps; Alfred Swan, Low Fell Works, Gateshead-on-Tyne, England.

314,041 Electro Magnet; Edwin D. McCracken, Paterson, N. J.

314,088 Electric Gas Lighter; Charles W. Weiss, Brooklyn, N. Y., assignor, by direct and mesne assignments, to the Weiss Manufacturing Company, of New York.

314,115 Chemical Stock Quotation Telegraph; Thomas A. Edison, Menlo Park, N. J., and Patrick Kenney, New York, N. Y.

314,119 Electric Gas Lighter; John Geary, Philadelphia, Pa.

314,155 Telephone Receiver; Theodore F. Taylor, Brooklyn, N. Y.

314,156 Telephone Receiver; Theodore F. Taylor, Brooklyn, N. Y.

314,157 Telephone Receiver; Theodore F. Taylor, Brooklyn, N. Y.

314,167 Electrical Safety Device for Elevators; Robert M. Curtiss, Brooklyn, N. Y.

314,208 Method of Protecting Incandescent Electric Lights; Nelson S. White, Canton, Mass.

A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.

If an invention has not been patented in the United States for more than one year, it may still be patented in Canada. Cost for Canadian patent, $40.00. Various other Foreign patents may also be obtained.

Neatly-bound volumes (half-yearly) of the ELECTRICAL REVIEW will be sent, postage prepaid, on receipt of $3; also the latest improved self-binders for the ELECTRICAL REVIEW, or any other electrical or scientific journal published in this country, for $1. ELECTRICAL REVIEW PUBLISHING CO., 23 Park Row, New York, N. Y.

WHEN WRITING for Catalogues & ordering Articles advertised in our columns please mention that you saw the advertisment in the ELECTRICAL REVIEW.

WM. C. DEWEY & CO.

SUCCESSORS TO
FRED. W. BROWN & CO.,
BANKERS AND BROKERS,
MEMBERS of the BOSTON STOCK EXCHANGE,
20 Congress St., Boston, Mass.
Stocks, Bonds and Investment Securities.
TELEPHONE & ELECTRIC LIGHT STOCKS
Bought and Sold on Commission.
CORRESPONDENCE SOLICITED.

THE CALLENDER INSULATING AND WATERPROOFING COMPANY

FACTORY: EAST NEWARK, N. J. 7 Nassau Street, New York. Factory of English Co.: ERITH, KENT, ENGLAND.

MANUFACTURERS of BITITE Insulated Wires and Cables for UNDERGROUND, OVERHEAD and SUBMARINE purposes. ANTI-INDUCTION TELEPHONE Cables (1 to 50 Conductors). SALAMANDER (Fire and Waterproof) Electric Light Line and House Wire. INCANDESCENT LEADS, &c. SILK and FANCY COVERED "Bitite" Lamp and Bell Wire. "C. C." Line Wire for Telephone or Telegraph Circuits of Iron or hard-drawn Copper.

CONTRACTORS for supplying and laying UNDERGROUND WIRES for all purposes.

For Estimates, &c., apply to W. M. CALLENDER, SECRETARY, 7 Nassau Street, New York.

WANTED.

By an experienced salesman of electrical supplies, a permanent position as manager of a business, or traveling salesman. Address

"A," care ELECTRICAL REVIEW, New York.

WANTED.

A man of ability and experience desires a situation with a Telephone Co., or an Electric Light Co. Have had six years' experience in the Telephone business in its various branches. Am single and 29 years of age. Can furnish the best of references. Address,

INSPECTOR, care Electrical Review.

WANTED.

A competent party capable of manufacturing Incandescent Lamps. Make written application to "H. K.," care

ELECTRICAL REVIEW, Box 3329, New York.

WANTED FOR SPOT CASH

Ten Thousand Incandescent Lamps, from 16 to 600 candle-power, low tension current, in lots of 500 each. Address

WM. E. CATLIN, 48 S. Canal St., Chicago, Ill.

WANTED.

An Electrician, six years experience with the Telephone, also well posted in the Electric Lights, would like a position in some permanent company.

Aderess ELECTRICIAN, Care Electrical Review.

OKONITE

NEW YORK INSULATED WIRE AND VULCANITE CO.,
13 Park Row, New York.
Hard Rubber for ELECTRICAL PURPOSE.

American Electric AND Illuminating Company.

General Office:

197 CONGRESS STREET, Boston, Mass.

This Company's business is the Construction and Sale of Complete Lighting Plants of the Famous "AMERICAN" or Thomson-Houston System of Electric Lighting, wherever desired in the United States.

The Success of the American Company and the System it represents has never been equaled by rival systems.

Special attention given to Installing Isolated or Individual Plants in Mills, Shops, Factories or Railroad Buildings.

Our New Illustrated Pamphlet, descriptive of the various Arc and Incandescent Systems of Lighting, Storage Batteries, Electric Motors and American Company's History, sent to any Address on Application.

American Electric & Illuminating Co.,
197 Congress Street,
BOSTON, MASS.

TRIPLEX INSULATED Wire and Rubber COMPANY.

Superior Quality of Insulation

ON ALL CLASSES OF ELECTRIC WIRES.

ADDRESS,
159 FRONT ST., NEW YORK CITY.

IMPROVED FOOT AND POWER LATHES, AND MACHINISTS TOOLS. CATALOGUES FREE. — LATHES ON TRIAL. SEBASTIAN, MAY & CO. 182 W. PEARL ST. CINCINNATI, O.

Electrical Development AND Manufacturing Company.

The Business of this Company is two-fold:

1st. The Manufacture and Sale of Electrical Apparatus, Supplies and Machinery of all kinds; and

2d. The Assisting of Inventors and Owners of Electrical Inventions, Discoveries and Devices to Develop, Patent and Render Commercially Valuable their Inventions, and incidentally to Test and Perfect all Sorts of Electrical Devices and Appliances.

This is the only company in existence for the purpose of aiding Electrical Inventors.

Inventions should be fully described to insure attention. Descriptive Communications regarded as strictly confidential.

The Legal and Patent Department in the hands of an attorney of acknowledged ability and long experience.

The Experimental, Manufacturing and Executive Departments in the hands of Experts thoroughly competent.

Send for Descriptive Circular and Prospectus.

Electrical Development & Mfg. Co.,
197 Congress St., Boston, Mass.

PAINE & LADD,

HALBERT E. PAINE, Late Commissioner of Patents. | STORY B. LADD.
Attorneys in Patent Causes And Solicitors of Patents.
WASHINGTON, D. C.

THE BUTLER HARD RUBBER CO.,

33 MERCER STREET, NEW YORK,
Manufacturers of
HARD RUBBER,
Sheets, Rods, Tubing, etc.,
ELECTRICAL SUPPLIES
Rubber Hook Insulators,
Window Tubes with Heads,
Key Knobs, Switch Handles,
Plug Handles, Lamp Switch Handles,
Battery Syringes, etc., etc.
Specialties of any PRACTICABLE CHARACTER made to order.

JNO. A. ROEBLINGS' SONS CO.'S

Galvanized Iron and Steel Wire.

ORDERS FILLED FROM STOCK.

The Electrical Supply Co.

175 AND 177 LAKE STREET, CHICAGO, ILL.